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IN COOPERATION WITH THE NATIONAL PARK SERVICE.

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## WEASEL vs. SQUIRREL

John P. Harville, Robert L. Hassur,  
George V. Pickwell, San Jose State College

Weasels generally are regarded as fiercely predatory mammals, entirely capable of destroying animals considerably larger and stronger than themselves. By contrast, squirrels are considered prey species, normally forced to run for their lives from a wide variety of natural enemies. Where weasels and squirrels occur together the usual relationship is one of predation by the weasels upon the squirrels both above the ground and below in the burrows. This predatory relationship has been exploited by man for centuries, particularly in the Old World where ferrets have been semi-domesticated for use in urban rat control.

Three biologists working in the Yosemite high country were forced to modify these stereotyped concepts following some unexpected observations of weasel-squirrel behaviour in mid-July of 1958. As a research team from San Jose State College, we were mapping Evelyn Lake near Tuolumne Pass, part of an extensive study of the lakes of that

region made in cooperation with the National Park Service. The following account is taken from field notes of our group.

During preliminary reconnaissance work at the east end of Evelyn Lake, we frequently saw a short-tailed weasel (*Mustela erminea*) hunting among the rodent burrows near the lake shore. Also observed was homing behaviour, indicating the presence of a weasel den among the rocks of that area.

A few days later our research team was taking soundings from a rubber life-raft near the opposite (west) end of Evelyn Lake. About mid-morning one of the biologists noticed a weasel hunting along a snowbank about 30 feet back from shore. The animal suddenly disappeared behind a snowdrift, a brief scuffle was heard, and in a moment it reappeared carrying the dark body of a large meadow vole in its jaws. We watched as *Mustela* (the weasel) began to carry its prey along the lake margin in the direction of the



den at the opposite end of the lake. Since weasels are small animals, only about eight inches long, the large vole constituted a considerable burden.

Ahead of the weasel the terrain was pocked with holes of the Belding ground-squirrel (*Citellus beldingi*). Many of these animals were foraging, with a few standing upright on hind legs in characteristic sentinel-like pose. *Mustela* showed considerable caution in approaching the first concentration of squirrels, rising on hind legs to look quickly about, then running swiftly forward a few steps, and stopping motionless momentarily before repeating the process.

Eventually the weasel's run-and-pause progression skirted close to one of the larger squirrels in sentinel position. This squirrel saw the intruder at approximately 40 feet and immediately began to advance in a series of short charges. Observing biologists noted that the animals advanced on each other in similar pattern, each standing upright, then dropping to the ground to rush forward a few rapid steps. When the two animals were about ten feet apart, the weasel suddenly broke to one side and began to run away, still carrying its heavy vole burden. The squirrel charged swiftly in pursuit. *Mustela's* evasive changes of direction obviously were clumsy under the handicap of its unwieldy load. The squirrel rapidly closed the gap over a zig-zag course of about 40 feet. Suddenly, the speed and agility of the weasel increased sharply, and through a series of swift direction changes, the closely pursuing squirrel was eluded. The weasel then ran quickly down its back trail. We now could see that its jaws were empty, which explained the sudden burst of speed observed. The

weasel quickly recovered the vole and started for its den.

In the meantime, the squirrel abandoned its random searching and again stood upright. In a few seconds it relocated the weasel, and gave pursuit. Once more, *Mustela* dropped the vole when almost overtaken and successfully avoided its pursuer. Again *Mustela* found the vole and continued toward its den, this

#### The Squirrel

—W. P. Ward



time still closer to it. The entire process was repeated a third time. With this chase *Mustela* had maneuvered beyond the apparent territory of the squirrel, which now abandoned the chase and returned to its original sentinel post.

While watching this interesting conflict we at first believed that the weasel had encountered an unusually aggressive squirrel. However, when *Mustela* came within range of a second large squirrel in sentinel-position, the approach and chase-pattern was twice repeated in apparently identical fashion. Thus *Mustela* was forced into five strenuous avoidance maneuvers by two different squirrels. In each case, the weasel was able to progress farther along the lake shore, and finally we were too far away to observe its further progress.

In attempting to analyze these observations it should be noted that a fully-grown Belding ground-squirrel is at least equal in size to an adult *Mustela erminea*. Further, the squirrel possesses an excellent armament of heavy incisor teeth and powerful

digging claws. However, the weasel might logically be expected to possess the superior combative armament both physically and temperamentally. Further, weasels certainly prey upon young Belding squirrels, and a carry over of prey-predator behavior might be expected even with adult squirrels.

If these assumptions are in any part correct, then the observations reported here probably constitute the over riding of usual prey-predator relations by strong territorial behavior, in which the prey species is the aggressor in driving the predator species from its home domain. If such is the case, it constitutes yet another instance in which a presumed weaker animal behaves in its home territory in a sufficiently aggressive manner to drive a stronger animal away. It also might be assumed that the weasel has as a primary drive the return of food to its den, and therefore avoids combat. In any case, these assumptions are consistent with the observed behavior, and also appear conducive to survival of both species.

The Weasel

—Hood, NPS





## THE LITTLE BULLY

Lloyd D. Moore, Ranger-Naturalist

Until about one month ago, my front yard was always full of bird life. All winter long my wife and I had waited, and this spring it appeared that we would have a wealth of bird life. Then "The Bully" arrived. One usually thinks of a bully as being a rather large animal, but this one is only about six inches in length. The bully I am referring to is the western wood pewee which has taken over my front yard as a home site.

Since the pewees have started rearing their family in a black oak in the yard we no longer see any other birds in the yard. The pewee has established a very definite territorial border for his home site. It is approximately 100 feet in diameter, with the nest the center of the area. Any other bird entering this protective circle is promptly driven out. As with all members of the flycatcher family, the pewee is a very skillful flier and can match the erratic flight of the insects upon which it feeds. Though smaller than an intruding bird, the pewee is completely fearless and can literally fly circles around the interloper. By dive bombing and pecking on each pass, the little pewee completely unnerves the bird and it leaves as quickly as possible.

The most common intruder into the pewee's homesite is the Steller's Jay which frequently feeds upon the eggs and chicks of other birds. Each time a jay enters the area the pewee sets up a tettrific din, hoping, I suppose, to scare the jay away. These tactics usually fail, so the pewee

goes to work with a vengeance and drives the larger bird from the area.

It has been most interesting to note the reaction of the other birds to the boundary set up by the pewee. They will fly or hop right up to the edge of the area but will not venture into the area. They must know from experience what lies in store for them if they enter the forbidden land.

On several occasions the pewee has been brash enough to try to keep my wife and me from entering our house. He keeps making short dashes at our heads, shrieking at the top of his voice all the time. After we get in the house he sits on a post in the front yard looking quite proud of himself for having chased us in to our house and out of his territory.

While waiting for my son to be born I found myself with a lot of unoccupied time on my hands. One morning I spent three hours just watching the pewee catch insects. During that three hour period I saw the pewee catch and apparently eat 279 insects. This would average some 93 insects an hour, or a little more than one and a half a minute.

The pewee is one of the first birds to start singing in the morning and one of the last to stop in the evening so he puts in about 15 hours a day. If he catches an average of 93 insects an hour, this would be 1,395 insects a day. If he kept catching them at this rate for the entire year, this single pewee would consume 509,175 insects a year. A pair of them would eliminate 1,018,350 of these insects. A pair of pewees will have from three to six eggs a clutch and they may



rear two clutches a year. Just think of the staggering number of insects that would cease to be if all of the young pewees grew to maturity and ate as much as their parents. Some of the fly spray companies would certainly be forced out of business by the birds. Nearly all other members of the flycatcher family do as well by the insects.

There is just one question in my mind. What does the pewee do with that many insects? It hardly seems possible that it could actually eat 1,395 insects a day. Even 500 insects should more than fill its tiny body. Yet only four times while I was watching did the pewee actually visit the nest. Most of its time was taken up with either sitting on the tip of a dead branch watching for insects or else flitting merrily after another insect. I saw no sign of pockets or a bag into which the bird could stuff the insects after they had been caught.

Of course it is merely a supposition on my part to think that the pewee might continue catching insects at the rate of 93 an hour and keep it up all day long. Still, I have seen them hunting at nearly every one of the daylight hours. Even working an eight hour day and a 40 hour



—Hood, NPS

"The Little Bully"


week, the pewee would still consume 3,720 insects a week. Think how buggy the world would be without our "little bully", the western wood pewee!

## BEAUTIFUL CANVAS

Alfred E. Brighton

Winter lifts the golden veil  
Of Autumn from the trees.  
Stubbles in the cornfields  
Are beaten to their knees,  
And he covers it with blankets,  
Beauty of the silent snow.  
Then the echo of a raven  
Who knew not when to go.

Winter's night is deeply on us,  
But the dawn of Spring will break.  
Winter only spreads the canvas  
For the Mighty Painter's art  
To paint a Summer time to gladden  
And give cheer to every heart.



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Momo and Popo Yosemite Toad are lined up on a rock to have their portrait taken. But Popo is comero-shy and turns his back. "Come on Popo, please look this way. Don't you know there is a big black fly coming out of the big black box?"

## POADS



"That's fine Popo. But Momo . . . You've been so good. Let's try again."



"Oh, NO! Popo, not so fast. The fly has gone away anyhow. Now try sitting still like Momo."



Arrghh!! Popo, what IS your problem? Oh, the comero makes you nervous. Well let's shoot the last one on the roll."



"No, NO, NO! See how nicely Momo poses for the comero? This way, please!"



"That's more like it! Won't all the little Yosemite Toads be proud of their Popo and Moma's picture?"



## OUT OF YOSEMITE'S PAST

E. W. Blew

Traveling by car into Yosemite in 1960 is one thing . . . traveling by car into the Park in 1914 was an entirely different experience.

When Yosemite was first opened to automobiles back in July 1914,, my wife and I and our two children drove our Ford from Los Angeles (a four day trip) to Yosemite for our annual vacation. It was our first vacation by car and only those who drove a car for the first time on a vacation back in those early days of travel can know the thrill.

The state road program of paving main highways had gotten under way the year before and there was a lot of detouring through a great deal of dust. Today with our fine freeways there is not the appreciation of what we had to put up with back in 1913 and '14. And, of course, the roads into Yosemite were not paved . . . just rutted-dirt, single-track roads. To pass a vehicle on a level stretch of road was no problem, but when the passing was on a mountain grade it took on a different aspect. We had just such an experience. As we were coming in from Fresno, a motor bus was coming out. Frankly, I couldn't see how we could pass on such a narrow rutted road. But evidently the bus driver had had some practice. Several men on the bus, at the suggestion of the driver, got out and lifted my Ford off the road over against a tree. Then the bus proceeded cautiously, but not without taking some paint off the fenders. Then the men lifted my car back onto the road and we went merrily on our way.

When we reached the first checking station we were warned not to drive faster than 15 miles an hour and the time we should reach the next checking station was noted on our entrance card. There were several stations and at each one our card was marked with the time for reaching the next station.

We set up camp in the newly provided grounds set aside for campers coming in by car. The week we spent there was a never-to-be forgotten vacation. It was one of the most enjoyable. There was no hurry in those days. We took things less surely. We look back with happy memories on that outing.

Several facts stand out. One that the bears did not bother us as in latter years. Also, we never saw so much water flowing over the various falls as in 1914. It was in abundance. Trips today do not bring the thrill we experienced on that memorable first trip in July 1914. It was a new experience . . . a happy one!

"A passerby courteously helped us take our portrait. We were all very proud of our shiny (but dusty) new car and the way it handled on the mountain grades. The date was July 1914, the first year cars were allowed to enter the park. Ours was one of the first auto tourist camps in Yosemite."





## WHY DO BIRDS SCREAM,

Douglass H. Hubbard, Park Naturalist

From the commotion the birds were making I expected at least a ten foot rattlesnake. As I moved cautiously up the rocky slope behind my home in Yosemite Valley I could see a circus of birds. Raucous blue-fronted jays, excited robins, and blackheaded grosbeaks of both sexes, the latter giving single, excited, penetrating alarm notes. As I stepped gingerly through the leaves I tried to sight spot the object of the birds' displeasure. They were diving over what appeared to be an object on the ground, one show-off at a time, while the other birds screamed their approval at this demonstration of bravery.

The hackles rose on my neck as I moved slowly up the slope, from tree to tree. It was late afternoon and visibility was low. Rattlers blend with leaves. I paused for my eyes to become accustomed to the light.

Do you know what I finally found? One little pigmy owl, not six inches high, on a low branch of a live oak! His head was pulled down on his shoulders against the poor show of manners of his avian neighbors, but otherwise he appeared unconcerned.



Pigmy Owl and Prey.

I was within about four feet when the little owl flew off, trailing screaming birds behind him like sparks from a Roman candle.

As I retraced my steps I pondered over the capacity of one small bird to start full scale war games by his relatives. Birds are rather like people

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*In the past we have been too busy making history to think about it. But now with more than three centuries of history behind us, and a thousand years or more behind that of unknown ancient Indian civilization, a few of us are beginning to realize, and to impress upon others, the need for the preservation and interpretation of our historical treasures. Horace M. Albright, former Director, National Park Service.*



## A SWIMMING MOUSE

Howard H. Cofer, Ranger Naturalist

It was 4 p.m. on July 28th and we had just returned to Tuolumne Meadows from a three-day trip to the top of Mount Lyell and its glacier. The walk back from Upper Lyell Base Camp was long and dusty, so I had gone to the High Sierra Camp dining room to quench my thirst. Then I retreated to the back porch and sat in a chair along the bank of the Tuolumne river. Here my shoes could be removed while we waited for the pack mules to bring our sleeping bags, pots and pans, etc.

In a moment my senses were lulled by the rushing waters and weariness from the long hike. Suddenly through half-opened eyes, the figure

of a small animal was noticed moving hurriedly down a fallen log on the opposite side of the stream. With no hesitation it entered the water and swam across to the bank close to me. It was a meadow mouse (*Microtus sp.*). I was surprised to see it go into the water, and even more astonished to see that its fast pace was not reduced in the least upon entering the water. Nor was this little furry creature swept out of its direct course by the swift running water. On reaching the bank, our mouse turned down the river at the same rapid clip and soon disappeared into the grass, a much more natural habitat, it seemed to me.

## NOTE ON THE YOSEMITE HERBARIUM

Paul Sage, Museum Aid

Early in July this summer the museum's collection of herbarium specimens of the genus *Lupinus* was sent to Dr. David Dunn of Missouri Botanic Gardens for examination. Dr. Dunn is one of the leading authorities on this fascinating but very difficult group of plants. He carefully examined and annotated each of the seventy-six specimens in the Yosemite National Park herbarium collection and identified six specimens which previously had not been determined. In addition, the identity of twenty-two specimens has either

been corrected or made more exact in accordance with recent concepts relating to the nature of speciation in the genus. Dr. Dunn indicated that evidence of hybridization between species may be found in at least seven specimens in the museum collection.

The following species and subspecies are now included in the collection:

- Lupinus albicaulis* Dougl. ex Hook X
- L. formosus* Greene var. *bridgesii* (Wats.) Greene.
- L. albifrons* Benth.

- L. andersonii* Wats. var. *christinae* (Heller) Munz.
- L. arbustus* Dougl. in Lindl. subsp. *silvicola* (Heller) Dunn.
- L. benthamii* Heller.
- L. bicolor* Lindl. subsp. *tridentatus* (Eastw. ex. C.P.Sm.) Dunn.
- L. breweri* Gray.
- L. covillei* Greene.
- L. formosus* Green, var. *bridgesii* (Wats.) Greene.
- L. grayi* (Wats.) Wats.
- L. latifolius* Agardh.
- L. latifolius* Agardh. var. *columbianus* (Heller) C.P. Sm.

- L. lyallii* Gray.
- L. lyallii* Gray. var. *danus* (Gray) Wats.
- L. lyallii* Gray. var. *lobbii* (Gray ex. Greene) C.P.Sm. in Jeps.
- L. sellulus* Kell.
- L. stiversii* Kell.
- L. supurbus* Heller.
- L. vallicola* Heller.

Work such as the examination of the genus *Lupinus* by Dr. Dunn is but a small part of the effort that is constantly being carried on to keep all phases of the interpretive program in Yosemite on a superior level.

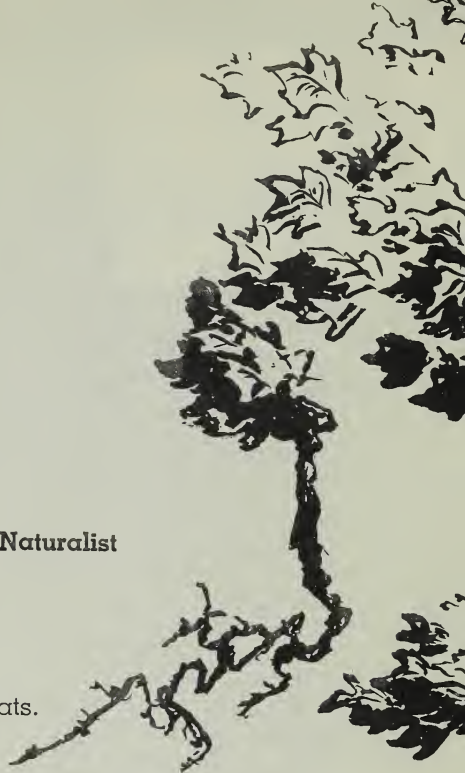
# OAKS

Allan E. Shields, Ranger Naturalist

ne iron-hearted oaks still firmly rise  
here friendly natives wove kiskiska mats  
om giant-standing grasses under skies  
becked with swallows every dusk and with bats.

These stolid oaks now testify to the past,  
Showing scars where each has offered up her limbs  
Never meant for use on trim ships, spar or mast.  
Looking up in them we sometimes hear the hymns  
Sung by new limbs that are growing 'round each gash.

Former storms of sleet, rain, wind, and snow  
Ended lives of other oaks, and while some crash  
Was carried off on frenzied air, blow on blow,  
Remaining oaks felt the message from the ground,  
That all nature shouts a song as they go down.





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